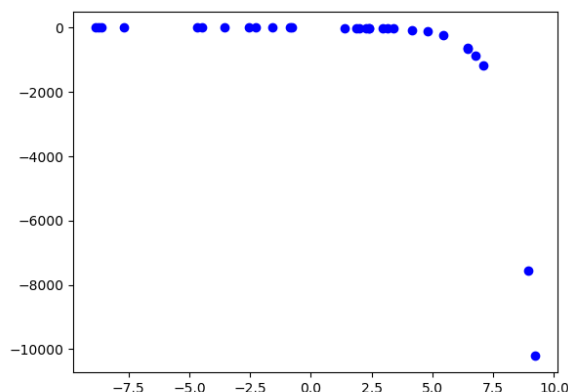


This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found [here](#).

If you have a suggestion to make the keys better, please fill out the short survey [here](#).

*Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.*

1. Determine the appropriate model for the graph of points below.



The solution is Exponential model, which is option B.

- A. Non-linear Power model

For this to be the correct option, we need to see a polynomial or rational shape.

- B. Exponential model

For this to be the correct option, we want an extremely slow change early, then a rapid change later.

- C. Logarithmic model

For this to be the correct option, we want a rapid change early, then an extremely slow change later.

- D. Linear model

For this to be the correct option, we need to see a mostly straight line of points.

- E. None of the above

For this to be the correct option, we want to see no pattern in the points.

**General Comment:** This question is testing if you can associate the models with their graphical representation. If you are having trouble, go back to the corresponding Core module to learn about the specific function you are having trouble recognizing.

2. For the scenario below, use the model for the volume of a cylinder as  $V = \pi r^2 h$ .

*Pringles wants to add 24 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?*

The solution is About 7 percent, which is option D.

A. About 12 percent

This corresponds to treating both radius and height as equal contributors and not solving correctly.

B. About 11 percent

This corresponds to solving correctly but treating both radius and height as equal contributors to the volume.

C. About 3 percent

This corresponds to not solving for the increase properly.

D. About 7 percent

\* This is the correct option.

E. None of the above

If you chose this, please contact the coordinator to discuss how you solved the problem.

**General Comment:** Remember that when plugging the increases of values in, you need to treat it as that percentage above 100. For example, a 5 percent increase means 105 percent.

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3. Solve the modeling problem below, if possible.

*A new virus is spreading throughout the world. There were initially 6 many cases reported, but the number of confirmed cases has tripled every 5 days. How long will it be until there are at least 1000000 confirmed cases?*

The solution is About 55 days, which is option C.

A. About 25 days

You modeled the situation with  $e$  as the base and did not apply the properties of log correctly.

B. About 61 days

You modeled the situation with  $e$  as the base, but solved correctly otherwise.

C. About 55 days

\* This is the correct option.

D. About 24 days

You modeled the situation correctly but did not apply the properties of log correctly.

E. There is not enough information to solve the problem.

If you chose this option, please contact the coordinator to discuss why you think this is the case.

**General Comment:** Set up the model the same as in Module 11M. Then, plug in 1000000 and solve for  $d$  in your model.

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4. Solve the modeling problem below, if possible.

*In CHM2045L, Brittany created a 22 liter 18 percent solution of chemical  $\chi$  using two different solution percentages of chemical  $\chi$ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 18 percent and 32 percent solutions, what was the amount she used of the 32 percent solution?*

The solution is 0.00*liters*, which is option C.

A. 22.00*liters*

This is the concentration of 18 percent solution.

B. 11.00*liters*

This would be correct if Brittany used equal parts of each solution.

C. 0.00*liters*

\*This is the correct option.

D. 11.84*liters*

This was a random value. If this was not a guess, contact the coordinator to talk about how you got this value.

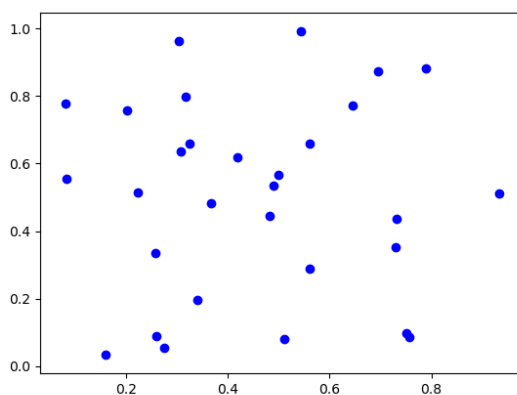
E. There is not enough information to solve the problem.

You may have chose this if you thought you needed to know how much of the second solution was used in the problem. Remember that the total minus the first solution would give you the second amount used.

**General Comment:** Build the model exactly as you did in Module 9M. Then, solve for the volume you are looking for.

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5. Determine the appropriate model for the graph of points below.



The solution is None of the above, which is option E.

A. Exponential model

For this to be the correct option, we want an extremely slow change early, then a rapid change later.

B. Logarithmic model

For this to be the correct option, we want a rapid change early, then an extremely slow change later.

C. Linear model

For this to be the correct option, we need to see a mostly straight line of points.

D. Non-linear Power model

For this to be the correct option, we need to see a polynomial or rational shape.

E. None of the above

For this to be the correct option, we want to see no pattern in the points.

**General Comment:** This question is testing if you can associate the models with their graphical representation. If you are having trouble, go back to the corresponding Core module to learn about the specific function you are having trouble recognizing.

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6. For the information provided below, construct a linear model that describes her total budget,  $B$ , as a function of the number of months,  $x$  she is at UF.

*Aubrey is a college student going into her first year at UF. She will receive Bright Futures, which covers her tuition plus a \$400 educational expense each year. Before college, Aubrey saved up \$9000. She knows she will need to pay \$1000 in rent a month, \$40 for food a week, and \$64 in other weekly expenses.*

The solution is none of the above., which is option E.

A.  $B(x) = 9000x + 400$

This treats the savings as something you get every month rather than a 1-time payment and is modeling Income, not Budget.

B.  $B(x) = 9400 - 1416x$

C.  $B(x) = 400x + 9000$

This treats the educational expense as something you get every month rather than a 1-time payment and is modeling Income, not Budget.

D.  $B(x) = 9400 - 1104x$

This treats weekly expenses as month expenses rather than multiplying each weekly expense.

E. None of the above.

\* This is the correct option as the model should be  $B(x) = 1416 - 9400x$ .

**General Comment:** This is a Costs, Profit, Revenue question! The most common issues here are: (1) not converting the weekly costs to monthly costs, (2) treating the one-time values like savings and educational expense as happening per month, and (3) not checking that your model is for cost, profit [income], or revenue [budget].

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7. Solve the modeling problem below, if possible.

*A new virus is spreading throughout the world. There were initially 4 many cases reported, but the number of confirmed cases has doubled every 3 days. How long will it be until there are at least 1000 confirmed cases?*

The solution is About 24 days, which is option B.

A. About 10 days

You modeled the situation correctly but did not apply the properties of log correctly.

B. About 24 days

\* This is the correct option.

C. About 9 days

You modeled the situation with  $e$  as the base and did not apply the properties of log correctly.

D. About 17 days

You modeled the situation with  $e$  as the base, but solved correctly otherwise.

E. There is not enough information to solve the problem.

If you chose this option, please contact the coordinator to discuss why you think this is the case.

**General Comment:** Set up the model the same as in Module 11M. Then, plug in 1000 and solve for  $d$  in your model.

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8. The temperature of an object,  $T$ , in a different surrounding temperature  $T_s$  will behave according to the formula  $T(t) = Ae^{kt} + T_s$ , where  $t$  is minutes,  $A$  is a constant, and  $k$  is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature,  $T$ , based on the amount of time  $t$  (in minutes) that have passed. Choose the correct constant  $k$  from the options below.

*Uranium is taken out of the reactor with a temperature of  $130^\circ\text{C}$  and is placed into a  $20^\circ\text{C}$  bath to cool. After 29 minutes, the uranium has cooled to  $64^\circ\text{C}$ .*

The solution is None of the above, which is option E.

A.  $k = -0.03736$

This uses  $A$  as the initial temperature and solves for  $k$  correctly.

B.  $k = -0.02224$

This uses  $A$  as the initial temperature and solves for  $k$  incorrectly.

C.  $k = -0.02289$

This uses  $A$  correctly and solves for  $k$  incorrectly.

D.  $k = -0.03266$

This uses  $A$  as the bath temperature and solves for  $k$  incorrectly.

E. None of the above

\* This is the correct answer as  $k = -0.03160$ .

**General Comment:** The initial temperature is when  $t = 0$ . Unlike power models, that means  $A$  is not the initial temperature!

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9. For the scenario below, use the model for the volume of a cylinder as  $V = \pi r^2 h$ .

*Pringles wants to add 34 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?*

The solution is About 10 percent, which is option A.

A. About 10 percent

\* This is the correct option.

B. About 16 percent

This corresponds to solving correctly but treating both radius and height as equal contributors to the volume.

C. About 3 percent

This corresponds to not solving for the increase properly.

D. About 17 percent

This corresponds to treating both radius and height as equal contributors and not solving correctly.

E. None of the above

If you chose this, please contact the coordinator to discuss how you solved the problem.

**General Comment:** Remember that when plugging the increases of values in, you need to treat it as that percentage above 100. For example, a 5 percent increase means 105 percent.

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10. Solve the modeling problem below, if possible.

*In CHM2045L, Brittany created a 24 liter 24 percent solution of chemical  $\chi$  using two different solution percentages of chemical  $\chi$ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 17 percent and 39 percent solutions, what was the amount she used of the 39 percent solution?*

The solution is 7.64liters, which is option B.

A. 12.00liters

This would be correct if Brittany used equal parts of each solution.

B. 7.64liters

\*This is the correct option.

C. 16.36liters

This is the concentration of 17 percent solution.

D. 15.04liters

This was a random value. If this was not a guess, contact the coordinator to talk about how you got this value.

E. There is not enough information to solve the problem.

You may have chose this if you thought you needed to know how much of the second solution was used in the problem. Remember that the total minus the first solution would give you the second amount used.

**General Comment:** Build the model exactly as you did in Module 9M. Then, solve for the volume you are looking for.

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